INDOOR AIR QUALITY ASSESSMENT

Berkley Middle School
21 North Main Street
Berkley, Massachusetts

Prepared by:
Massachusetts Department of Public Health
Bureau of Environmental Health Assessment
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Background/Introduction

At the request of Robert James, Superintendent of Berkley Schools, the Massachusetts Department of Public Health (MDPH), Bureau of Environmental Health Assessment (BEHA) provided assistance and consultation regarding indoor air quality concerns at the Berkley Middle School, 21 North Main Street, Berkley, Massachusetts. Berkley School Department (BSD) officials requested the BEHA visit due to ventilation concerns regarding the build up of odors from the new gymnasium floor. Shortly after the school was opened, following a holiday weekend, occupants detected noticeable odors.

On January 29, 2002, a visit was made to the school by Cory Holmes, Environmental Analyst for BEHA's Emergency Response/Indoor Air Quality (ER/IAQ) program. Mr. Holmes was accompanied during the assessment by Tony Rose, Director of Buildings and Grounds, Berkley Public Schools.

The school is a two-story brick building constructed in 2000-2001. The building was initially occupied following the 2001 Christmas break. The school contains general classrooms, science classrooms, kitchen, cafeteria, media center, special education classrooms, office space and gymnasium. The gymnasium floor is made of a poured-in-place monolithic urethane flooring system (see Picture 1), which consists of 75% urethane and 25% rubber (Martin, date unknown). This gymnasium floor was reportedly installed on June 1, 2001. The maximum drying time once applied, which is dependent on ambient temperature and relative humidity, is 72 hours (Martin, 1999) (see Attached).

The gymnasium is used on a daily basis as well as at night for various school sports and programs. In addition, the gymnasium is used on the weekends for public sports events. According to school officials, no further odor complaints, symptoms or

health effects have been reported by school occupants or members of the general public to the BSD.

Methods

Air tests for carbon dioxide, temperature and relative humidity were taken with the TSI, Q-Trak, IAQ Monitor. Screening for total volatile organic compounds (TVOCs) was conducted using a Thermo Environmental Instruments Inc., Model 580 Series Photo Ionization Detector (PID). Outdoor background TVOC measurements were taken for comparison to indoor levels.

Results and Discussion

According to Mr. Rose, the mechanical ventilation system (see Pictures 2 & 3) currently operates seven days a week. A computerized system activates ventilation at approximately 5:30AM and deactivates the system at approximately 9:30PM. Shortly after the initial odor complaint, ventilation was increased in the gymnasium to help dissipate any lingering floor-related odors. In addition, the floor is washed nightly by school maintenance staff with a neutralizing compound and air-dried.

BEHA staff took background samples in a number of locations outside the school. Air measurements were taken at the center of the gymnasium, as well as in each corner near the floor surface, for comparison to outdoor levels (see Table). TVOC readings within the gymnasium were found to be below detection limits. While these results suggest that no interior source is creating a build up of pollutants, a slight rubber-like/urethane odor was noted in the gym area.

Temperature readings in the gym ranged from 70° F to 72° F, which were within the BEHA recommended range for comfort. The BEHA recommends that indoor air temperatures be maintained in a range between 70 ° F to 78 ° F in order to provide for the comfort of building occupants. In many cases concerning indoor air quality, fluctuations of temperature in occupied spaces are typically experienced, even in a building with an adequate fresh air supply.

The relative humidity measured in the building ranged from 36 to 37 percent, which was slightly below the BEHA recommended comfort range. The BEHA recommends that indoor air relative humidity is comfortable in a range of 40 to 60 percent. Relative humidity levels in the building would be expected to drop during the winter months due to heating. The sensation of dryness and irritation is common in a low relative humidity environment. Low relative humidity is a very common problem during the heating season in the northeast part of the United States.

Conclusions/Recommendations

The air testing conducted by BEHA staff would indicate that the levels of TVOCs are below detection limits. Health effects (if any) associated with short-term exposure to this product would have likely occurred during (and/or shortly thereafter) the day of the installation of the gymnasium floor. Due to the curing time of the product (72 hours), the time lapse since the floor was installed (> 7 months), and the general lack of reported complaints/symptoms/health effects, individuals at the Berkley Middle School are not likely to experience health effects related to this product.

It is important to note, however that certain chemical constituents can have a low odor threshold that can cause symptoms for sensitive individuals. The warning threshold

for a chemical is defined as a concentration at which a person can smell, taste or experience irritation to the eyes, nose or throat. Under the worker safety standards set by the Occupational Safety and Health Administration (OSHA), employees can be exposed to chemicals up to the Permissible Exposure Level (PEL) established for that chemical. The PEL is an airborne concentration which, if exceeded over the course of a work period, can result in OSHA taking administrative action to reduce exposure. Meeting these standards within a work area does not prevent possible symptoms to exposed individuals. In addition, there are also guidelines for exposure to chemicals in air designed to protect more sensitive individuals, such as children.

In view of the findings at the time of this visit, the following recommendations are made:

1. Continue to operate mechanical ventilation in the manner described in the discussion portion of this report to maximize air exchange and to help remove residual odor associated with the gymnasium floor.
2. For buildings in New England, periods of low relative humidity during the winter are often unavoidable. Therefore, scrupulous cleaning practices should be adopted to minimize common indoor air contaminants whose irritant effects can be enhanced when the relative humidity is low. To control for dusts, a HEPA filter equipped vacuum cleaner in conjunction with wet wiping of all surfaces is recommended. Drinking water during the day can help ease some symptoms associated with a dry environment (throat and sinus irritations).

References

Martin. Date Unknown. Martin Duel Durometer VS. Plastic/Elasti-Plus Type System. Martin Surfacing, Inc. Delran, New Jersey.

Martin. 1999. Versaturf 360 Material Data Safety Sheet/Product Description. Martin Surfacing, Inc. Delran, New Jersey.

Picture 1

Gymnasium Flooring System

Picture 2

Ceiling-Mounted Ductwork to Gymnasium Ventilation System

Picture 3

Wall-Mounted Return Vent for Gymnasium Ventilation System

TABLE 1

Indoor Air Test Results – Berkley Middle School, Berkley, MA – January 29, 2002

Remarks	TVOCs	Carbon Dioxide *ppm	Temp. °F	Relative Humidity %	Occupants in Room	Windows Openable	Ventilation		Remarks
							Intake	Exhaust	
Outside-North (Background)	0.0-0.2	377	71	35					Weather Conditions: unseasonably warm, light breeze
Outside-East	0.0-0.1	377	71	35					
Outside-South	0.0-0.2	379	71	35					
Outside-West	0.0-0.2	378	71	35					
Gym Center	0.0	520	70	36	15-20		Y	Y	Mechanical ventilation operating
Gym NW corner	0.0	530	72	36	15-20		Y	Y	
Gym NE corner	0.0	525	71	36	15-20		Y	Y	
Gym SE corner	0.0	520	71	37	15-20		Y	Y	
Gym SW corner	0.0	520	70	37	15-20		Y	Y	

*** ppm = parts per million parts of air**
CT = water-damaged ceiling tiles

Comfort Guidelines

Carbon Dioxide -	< 600 ppm = preferred
	600 - 800 ppm = acceptable
	> 800 ppm = indicative of ventilation problems
Temperature -	70 - 78 °F
Relative Humidity -	40 - 60%